

Mission Success

Ensign-Bickford Aerospace & Defense Company (EBAD) is dedicated to supporting our customers in the aerospace and defense industry through on-time delivery of innovative products that exceed expectations and assure mission success.

Model 9103CC2 Hold Down & Release Mechanism

EBAD is the global leader of non-pyrotechnic Hold Down & Release Mechanism (HDRM) for the space and defense markets. EBAD's industry-leading NEA® and TiNi™ mechanisms are offered in a range of sizes and custom mounting configurations.

The NEA® Model 9103CC2 is based on the Model 9103, integrating a cup/cone shear load interface, a bolt extractor, a bolt catcher, and source shock reduction elements to form a HDRM that's ideal for multi-point satellite release. In a 4-point release configuration, the 9103CC2 is designed to dispense up to 600 kG payloads separating laterally from a central dispensing structure. The 9103CC2 is delivered fully preloaded, so integration into space platforms is greatly simplified. The 9103CC2 is easily scaled up and down in load capacity by using a different NEA® HDRM model.

Principle of Operation

The NEA® Model 9103CC2 is an electrically initiated, one-shot mechanism that carries very high mechanical loads until commanded to release. The preload is applied through a release bolt that tightly restrains a cup/cone shear load interface. The bolt is held in place by two separable spool halves which are in turn held together by tight winding of restraining wire. The restraint wire is held in place by redundant electrical fuse wires; actuation of either circuit allows release, assuring maximum reliability. When sufficient electrical current is applied, the restraint wire unwinds allowing the spool halves to separate releasing the release bolt and allowing the two halves of the cup/cone interface to separate.

EBAD has developed a companion HDRM Firing Unit (HFU) that multiplexes a single Launch Vehicle firing order to actuate (4) Model 9103CC2's in diagonal pairs or simultaneously. The HFU assures proper current application to the HDRM to assure tight actuation simultaneity between the HDRMs. The HFU provides safety interlocks for Arming and Firing and provides status of HFU and HDRM for integration operations and launch readiness assurance.

NEA® Model 9103CC2
Hold Down & Release Mechanism (HDRM)



Applications

Typical applications include retention and release of:

- Antennas, reflectors, solar arrays, and deployable radiators
- Booms, masts, and scientific instruments
- Satellite and spacecraft deployment
- Launch vehicle and missile stage and fairing separation
- Missile payload separation

Key Features

- Non-explosive hold down & release function
- High restrained preload
- Extremely low release shock
- High simultaneity of multiple hold-down points
- Wide operating temperature range
- Can be operated with pyrotechnic initiation circuitry
- Space-rated materials
- Factory refurbishments
- More than 20 years of flight heritage
- Flight pedigree on more than 750 space platforms

NEA® Model 9103CC2
Hold Down & Release Mechanism (HDRM)

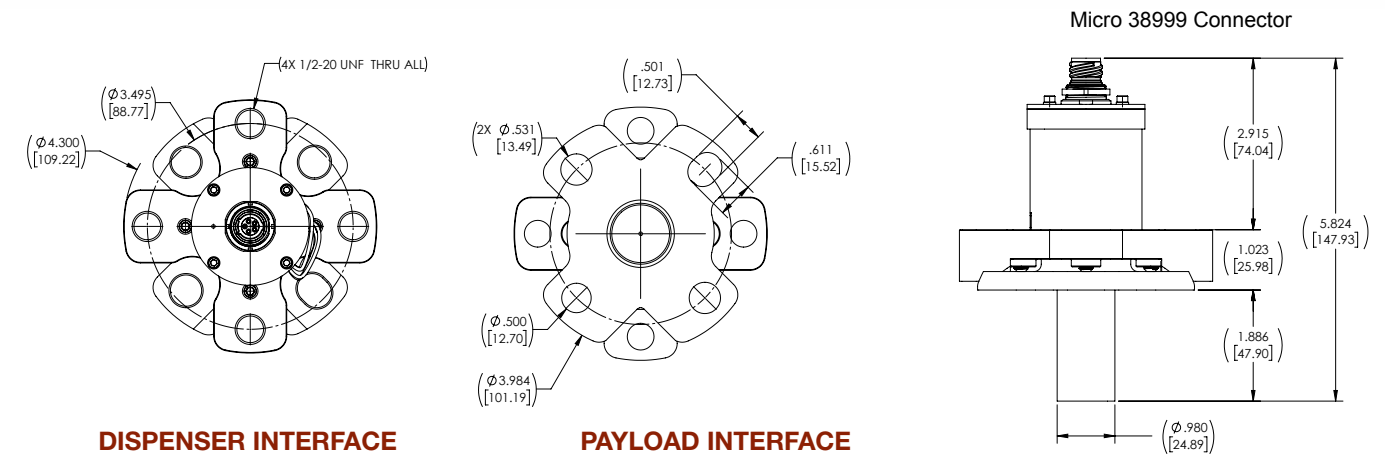
Model 9103CC2 Technical Specifications

Parameter	Capability
Preload (as Delivered)	37.8 kN (8,500 lbf)
Demonstrated Export Shock (Satellite Interface) ¹	20 g @ 2 kHz, < 380 g to 10 kHz
Demonstrated Export Shock (Dispenser Interface) ¹	30 g @ 2 kHz, < 650 g to 10 kHz
Fuse Wire Resistance	1.2 Ω to 2.0 Ω @ 25°C
Actuation Current ²	4 Amps for 25ms
No-Fire Current ³	250 mAmps at 10-5 Torr @ 110°C
Release Time @ Actuation Current ⁴	<15 mSec @ 7 Amps for 10 mSec
Release Simultaneity @ Actuation Current	+/- 2.5 mSec @ 7 Amps for 10 mSec
Fly Away Mass (Satellite Interface)	250 grams (0.55 lbf)
Total Mass	650 grams (1.43 lbf)
Operational Temperature Range ⁵	-105 C to +105 C
Axial Load ⁶	10.7 kN (2,405 lbf)
Shear Load ⁶	10.6 kN (2,383 lbf)
Bending Moment ⁶	484.5 Nm (357.3 ft-lb)
Torsion ⁶	525.9 Nm (387.9 ft-lb)

Notes:

- ¹ Export shock measurement uses HDRM preload of 37.8 kN, NASA standard aluminum test plate, and accelerometers adjacent to the HDRM.
- ² Actuation can be achieved using a wide range of current
- ³ No-fire current for 5 minutes or less as ambient temperature, consult EBAD applications engineers for other no-fire current requirements.
- ⁴ Release time is dependent on actuation current, preload, and temperature.
- ⁵ The values presented for qualification temperature range are not a measure of the limits of the device.
- ⁶ Axial, shear, bending moment, and torsional loads are applied simultaneously. Safety factors applied are Yield (1.3) and Ultimate (1.55).

Model 9103CC2 Hold Down & Release Mechanism (HDRM) Mechanical Interface Drawing



DISPENSER INTERFACE

PAYLOAD INTERFACE

Note: Model 9103CC2 HDRM shown. Different configurations available with alternate mounting features and connectors. Smaller and larger configurations available to accommodate different payloads.